

CLAIMS:

1. A battery comprising:
 - a first cathode operable to electrochemically reduce oxygen to produce hydroxide ions;
 - 5 a positive contact electrically connected to the first cathode to allow electrons to flow to the cathode;
 - means to allow air into the battery to provide oxygen for reduction at the first cathode;
 - an anode operable to receive hydroxide ions and undergo oxidation to produce
 - 10 electrons;
 - a negative contact electrically connected to the anode to allow electrons to flow from the anode; and
 - a first separator between the first cathode and the anode;
 - wherein the battery further comprises a second cathode operable to
 - 15 electrochemically reduce oxygen to produce hydroxide ions, the second cathode being electrically connected to a second positive contact which allows electrons to flow to the second cathode, wherein the second cathode is situated proximal to the negative contact and proximal to the anode, wherein the battery comprises means to allow air into the battery to provide oxygen for reduction at the second cathode, and wherein the battery
 - 20 comprises a second separator between the second cathode and the anode.
2. The battery of claim 1 wherein the first and second cathodes comprise catalysed carbon.
3. The battery of claim 1 or claim 2 wherein the anode comprises zinc.
4. The battery of claim 3 wherein the zinc is provided in a gelled mixture of zinc
- 25 powder and KOH electrolyte.
5. The battery of any one of claims 1 to 4 wherein the battery is a button battery.
6. The battery of claim 5 wherein a casing of the button battery is formed by the positive contact and the negative contact together with an insulating gasket.
7. The battery of claim 6 wherein the negative contact comprises the lid of the
- 30 battery casing, side portions of the lid being positioned within a can defined by the positive contact, the positive contact and the negative contact being electrically insulated from each other by the gasket lining the inside of the can.
8. The battery of claim 6 or claim 7 wherein the means to allow air into the battery to provide oxygen for reduction at the first cathode comprises at least one hole through
- 35 the positive contact.

9. The battery of claim 8 wherein an air distribution membrane is provided across the at least one hole.
10. The battery of any one of claims 6 to 9 wherein the means to allow air into the battery to provide oxygen for reduction at the second cathode comprises at least one
5 hole in the negative contact of the button battery.
11. The battery of claim 10 wherein an air distribution membrane is provided across the at least one hole in the negative contact of the button battery.
12. The battery of any one of claims 6 to 11 wherein the second positive contact is situated within the battery casing, extends from the first cathode to the second cathode,
10 and is insulated from the anode and the negative lid.
13. The battery of claim 6 wherein the button battery comprises first and second positive lids joined by a crimp seal on both facing sides of the button cell via electrically insulating grommets to a negative ring.
14. The battery of claim 6 or claim 7 wherein the means to allow air into the battery
15 to provide oxygen for reduction at the first cathode comprises at least one hole through the first positive lid.
15. The battery of claim 14 wherein an air distribution membrane is provided across the at least one hole.
16. The battery of any one of claims 13 to 15 wherein the means to allow air into the
20 battery to provide oxygen for reduction at the second cathode comprises at least one hole in the second positive lid of the button battery.
17. The battery of claim 16 wherein an air distribution membrane is provided across the at least one hole in the second positive lid of the button battery.
18. The battery of any one of claims 1 to 17 further comprising means to prevent
25 entry of air carrying oxygen into the battery to either of the first or second cathodes, prior to commencement of use of the battery.
19. The battery of claim 18 wherein adhesive tabs are used to seal the battery casing.
20. The battery of claim 19 wherein the adhesive tabs comprise adhesive metal-
30 polymer laminates.
21. The battery of any one of claims 1 to 20 wherein the first and second separators prevent migration of solid particles between the first and second cathodes and the anode.
22. The battery of any one of claims 1 to 21 wherein the battery further comprises
35 an electrically conductive yet electrochemically inactive backbone electrode.
23. The battery of claim 22 wherein the backbone comprises a metal.

24. The battery of claim 23 wherein the metal comprises copper.
25. The battery of claim 22 wherein the backbone comprises an alloy.
26. The battery of claim 25 wherein the alloy is brass.
27. The battery of claim 22 wherein the backbone comprises particles.
- 5 28. The battery of claim 27 wherein the particles are coated with a metal.
29. The battery of claim 28 wherein the metal is copper.
30. The battery of claim 27 wherein the particles are coated with an alloy.
31. The battery of claim 30 wherein the alloy is brass.
32. The battery of any one of claims 27 to 31 wherein the particles comprise
- 10 granules.
33. The battery of any one of claims 27 to 31 wherein the particles comprise flakes.
34. The battery of any one of claims 27 to 31 wherein the particles comprise fibres.
35. The battery of any one of claims 27 to 34 wherein the particles comprise a metal.
- 15 36. The battery of any one of claims 27 to 34 wherein the particles comprise a resistant polymer.
37. The battery of any one of claims 27 to 34 wherein the particles comprise silicon dioxide.
38. The battery of any one of claims 27 to 34 wherein the particles comprise
- 20 titanium dioxide.
39. A method of battery construction comprising the steps of:
 - providing a first cathode operable to electrochemically reduce oxygen to produce hydroxide ions;
 - electrically connecting a first positive contact to the first cathode to allow
 - 25 electrons to flow to the cathode;
 - providing means to allow air into the battery to provide oxygen for reduction at the first cathode;
 - providing an anode operable to receive hydroxide ions and undergo oxidation to produce electrons;
 - 30 electrically connecting a negative contact to the anode to allow electrons to flow from the anode;
 - providing a first separator between the first cathode and the anode;
 - providing a second cathode operable to electrochemically reduce oxygen to produce hydroxide ions, such that the second cathode is situated proximal to the
 - 35 negative contact and proximal to the anode;

providing means to allow air into the battery to provide oxygen for reduction at the second cathode;

electrically connecting a second positive contact to the second cathode which allows electrons to flow to the second cathode; and

5 providing a second separator between the second cathode and the anode.

40. The method of claim 39 wherein the first and second cathodes comprise catalysed carbon.

41. The method of claim 39 or claim 40 wherein the anode comprises zinc.

42. The method of claim 41 wherein the zinc is provided in a gelled mixture of zinc
10 powder and KOH electrolyte.

43. The method of any one of claims 39 to 42 wherein the battery is a button battery.

44. The method of claim 43 further comprising the step of forming a casing of the battery from the negative contact and the first positive contact by joining the positive
15 contact and the negative contact together with an insulating gasket.

45. The method of claim 44 further comprising electrically connecting the second positive contact to the first cathode within the casing and insulating the second positive contact from the anode and from the negative contact.

46. The method of claim 44 or claim 45 wherein the step of providing means to
20 allow air into the battery to provide oxygen for reduction at the first cathode comprises providing at least one hole through the first positive contact.

47. The method of claim 46 further comprising the step of providing an air distribution membrane across the at least one hole.

48. The method of any one of claims 44 to 47 wherein the step of providing means
25 to allow air into the battery to provide oxygen for reduction at the second cathode comprises forming at least one hole in the negative contact of the button battery to allow airflow to the second cathode.

49. The method of claim 48 further comprising the step of providing an air distribution membrane across the at least one hole in the negative contact.

30 50. The method of any one of claims 39 to 49, further comprising the step of providing means to prevent entry of air carrying oxygen into the battery to either of the first or second cathodes, prior to commencement of use of the battery.

51. The method of claim 43 further comprising the step of forming a casing of the button battery from the first positive contact, the second positive contact and the
35 negative contact, by forming the negative contact as a ring, positioning the first and

second positive contacts on opposed sides of the ring, and joining the positive contacts to the ring by a crimp seal with electrically insulating grommets.

52. The method of any one of claims 39 to 51 further comprising the step of providing an electrically conductive yet electrochemically inactive backbone of an electrode to decrease cell impedance.